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Sanitation Problems During a Flood

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THE Fraser River overflowed its banks at Agassiz at 2:30 a.m. on May 26, 1948. Agassiz is the business centre of the farming and resort area that comprises Kent Municipality, Harrison Mills, and the Village of Harrison Hot Springs. In a matter of hours, dirty brown flood waters had covered 5,500 acres of rich farm land. About 200 homes as well as many barns were damaged, and 1,800 people were directly affected.

Kent was one of the first areas affected by the Fraser Valley flood of 1948, considered one of the major disasters in British Columbia's history. The object of this paper is to discuss the sanitation problems encountered in the area during the flood. Emphasis will be placed on the methods of solution of the problems with which a sanitary inspector is most concerned. I do not suggest that these methods would be applicable to all floods. However, any sanitation problems during a disaster can be coped with by the intelligent application of sanitary principles.

The only difference between problems encountered in normal times, and those met with during a disaster, is one of degree. The principles followed in the solution of these problems are the same. The objective, the maintenance and promotion of health and the prevention of disease, is the same. Methods may vary, but the guidance of the public in the best ways of helping themselves is the most important part of the Health Department's approach.

When sent to a flooded area, the sanitary inspector must first spend some time on orientation. An idea of the extent of the flood must be obtained, along with information about the general topography of the district. In approaching the Agassiz area, I was first able to view the country from an aircraft, this being the best means of transportation, as the railroad, highways and bridges could not be travelled upon. From above, the district appeared to be a

triangular lake, studded with buildings. The turbulent, débris-strewn waters of the Fraser River formed the base, and mountains on the east and west formed the sides, converging on the village of Harrison Hot Springs at the apex in the north. The town of Agassiz was in the middle, and slightly above the base.

After gaining a general impression of the country in this manner, it was possible to appreciate the detailed information on several maps. The most useful of these was one used by the military, showing elevations, and drawn to a large enough scale to indicate every building.

After reporting to the local Health Department, my first move was to become acquainted with the people likely to be contacted about problems in the ensuing weeks. I was the only sanitary inspector in this area during the flood; the area was completely isolated, and practical contact outside the area was possible only by means of a somewhat unreliable telephone service. There were only two other workers on the health team: a part-time medical health officer and the public health nurse. Under these circumstances broad policies and principles were outlined in a few minutes by the medical officer, and we were on our own as far as our particular responsibilities were concerned. Actually, there was too much work to be performed, and too few persons to do it.

As an example, the public health nurse did everything in the nursing field—from delivery of a baby to an Indian woman in the abandoned railway station, to helping evacuate a six-month-old infant and family from a three-acre atoll on which they had been marooned. In the intervals between travelling from camp to camp, advising on infant and child care and disease prevention, she was handling an immunization program. Although the medical health officer gave some supervision to the public health nurse and the sanitary inspector, his main work was treating injuries and prescribing for ailments. The lack of fast methods of communication made it very difficult for him to keep in as direct contact with his team as he would have desired.

I was therefore required to plan and implement the local sanitation program. Because of this, it was necessary that I meet the people in the community from whom help could be expected in the institution of the program. Flood Control Headquarters, in one respect, was a central clearing house for information and was visited daily. The local police, the representatives of the army, and other officials such as the forest ranger and the game warden, were contacted.

The entomologist employed by the Dominion Government Experimental Farm in this area gave valuable advice on local mosquito and insect control. The reeve and councillors of Kent Municipality were individually met when possible, and the municipal clerk was most helpful. The ministers of the local churches and the active workers in the Red Cross were visited. Prominent business men, farmers, and leaders of the various veterans' organizations and service clubs were all contacted where possible. Certainly, the program could not have been successfully carried on without their help and active participation.

While meeting these people and discussing the situation, I gained a good idea of the existing services with which a sanitary inspector would be con-

cerned. There had never been a community water supply or sewerage system. Wells were of the sand point type, with little or no protection from surface seepage. The garbage collection had been made by a private truck owner on a call basis. Pasteurized milk normally was brought in from outside the area, but none was available at the time, due to lack of transportation. Privies ranged from the most primitive type to properly installed flush toilets discharging to septic tanks. Only one restaurant was left open in Agassiz, and the hotel dining room at Harrison Hot Springs was still operating. An idea of the number of people not evacuated from the area, and where they were at that time, was obtained. A few people were still in partly flooded homes, and the rest were in camps on the mountainside.

As information was gathered, the extent of sanitation problems became apparent. It would be interesting if during a flood some new problems occurred, but no; they were the usual problems, sometimes magnified, but essentially the same. Living quarters had been made uninhabitable, water supplies contaminated, stored foods made unsafe. And over everything—mud. Odorous and clinging, mud deposited by the flood waters was part of nearly everything, but it could not, with safety, become part of anything that was eaten or drunk, even in minute amounts. That message had to be delivered to the people still in the area. Communication, then, was the first problem, and contact with the people so vitally necessary that the Health Department could not afford to overlook any single method by which its message could be transmitted.

The Provincial Health Department, as well as distributing literature before the flood, had for some time been making use of the large metropolitan newspapers to instruct flood victims in disease prevention. These papers were dropped from aircraft. All radio stations were also used. As the local press was damaged, sanitation instructions were mimeographed by courtesy of the Harrison Hot Springs Hotel and distributed by members of the health team. The Provincial Health Department, in sending a sanitary inspector to the area and keeping in telephone communication with him, had availed themselves of another method, personal contact. Personal contact was sometimes slow and difficult, travel being restricted to boats and rubber boots, but it was very necessary and very effective.

The flood victims had formed community camps on hillsides and high ground. There were five of these groups, ranging in size from a few families to two hundred persons. The Red Cross did a wonderful job in providing for the comfort of the people in these camps. The local organization had planned for an emergency and were able to provide such necessities as blankets, mattresses, tents, clothing, cooking equipment and utensils, etc.

One of the Health Department's problems was basic sanitation. Provision had to be made for all human needs.

Privies were constructed with whatever materials were available, and located with due consideration for privacy, possible pollution of water supplies, and proximity to camp. Under prevailing conditions fly-proofing was impossible. Covering of contents with dry earth and the use of DDT insecticide was resorted to and found quite satisfactory.

Provision of drinking water in most camps was not a problem, as sites had been chosen close to hillside springs that had been used for many years. People were advised, however, to chlorinate or boil this water as there was a greater danger of pollution than ever, because of flood conditions. One camp was dependent upon the river for its water supply. As there were many good reasons why this camp should not be moved, a sand filter was used with success. The filter was improvised from a forty-five gallon steel drum. The top was removed, the bottom perforated, and the interior was partly filled with sand and gravel, ranging from very course at the bottom to fine at the top. Water was introduced at the top by means of a pump, and after it had operated for an hour the unit was delivering perfectly clear water. After chlorination, this water was used for all purposes.

Hot water was needed for ablution and laundering. Where an old stove could be obtained, this was no problem. An alternate method of heating water was by means of a tub or drum suspended on iron bars laid over a trench, in which a fire was kindled. Substitution of a sheet of iron for the water container provided a workable cooking surface.

The women took turns preparing food. Due to the limited facilities, meals were served in shifts. Galvanized iron tubs were used as sinks, and utensils were rinsed in a chlorine solution after washing. People were cautioned against the use of galvanized iron utensils in the preparation of foods, particularly those of an acid nature, because of the poisonous properties of the zinc used in the galvanizing process.

Safe storage of food was important. It had to be protected against dampness, heat, and rodent and insect damage. Trucks and trailers that had been moved to high ground were used for the storage of dry foods and canned goods. Coolers were improvised for perishable foods. These ranged from barrels set in holes in the ground and packed around with wet fern, to boxes aboveground covered with wet burlap.

All milk was considered unsafe until it had been pasteurized. The methods adopted were necessarily crude, and there was no means of determining exact temperatures. It was heated to the boiling point over a fire trench, and then cooled as rapidly as possible in running water at the spring or water source.

Garbage was either burned or buried, and every effort was made to keep the camp sites clean.

The camps were well organized. More or less by popular consent, some person or persons were recognized as the leaders in each group, and these people kept life in the camps on an organized basis. It was of paramount importance that the Health Department have the co-operation of these camp leaders, and in every case it was gladly given when the reasons for recommendations were explained.

During the day many of the people in the camps were absent, caring for stock, assessing damage to farms, or on various errands in connection with the work of the flood control committee. The Health Department realized that these people would be drinking water while away, and the danger of using raw water was stressed. Halogen tablets were distributed for purifying drinking water for the individual. An arrangment was made with the local druggist

to dispense, free of charge, small bottles of chlorine with droppers. Full instructions were printed on the labels. The demand for these was great. A visiting government official remarked that wherever he asked for a drink of water, he invariably received one of three replies: the water was boiled; the water was chlorinated; or no water had been prepared for drinking.

When the waters were rising, and while they stayed high, there was an element of excitement which sustained morale and made people capable of accepting their misfortune. However, when the flood began to recede, they became more aware of their losses, and day by day more depressed.

The appalling destruction became evident. Houses leaned precariously on damaged foundations. Soaked plaster was falling on floors buckled by water and filthy with mud. Fences and outbuildings were gone and barns damaged. The interiors were a shambles. In some places great channels were gouged through roads and farms, and some of the best soil was either washed away or covered with up to three feet of sand. Logs, fallen trees, and débris were everywhere.

The extent of the necessary clean-up and renovation became evident. The sanitary inspector's responsibilities gradually changed from the supervision of the sanitation of camps to post-flood problems. Disposal of dead animals, odors from stagnant pools, mosquito and fly control, and the renovation of farms and houses, including water supplies and waste disposal, had to be considered.

Thirty-three hogs on one farm had been drowned. Manual digging of a pit large enough to bury them was out of the question. As this farm was still inaccessible to machinery, burning was the only solution. The carcasses were placed in a pile, oil was applied, and they were ignited. There was a very serious fly problem here, which was completely controlled by the use of DDT sprayed from an agricultural hand pump. Single dead animals were pushed into holes and covered. Poultry was disposed of in the same way.

Mosquitoes were numerous enough to be demoralizing, and they bothered livestock to the extent of interfering with their well-being. An exterminating firm in Vancouver was engaged to spray the insects from trucks and aircraft. DDT was used and proved fairly effective. The entomologist at the Government Experimental Farm advised against the oiling of pools, as the predominant mosquito was of a species that would not hatch again that year.

Renovation of dwellings was the major post-flood problem in the opinion of most people. They were anxious to return to their homes, yet it was evident that there was a health risk unless the basic necessities were first provided. The local health authorities agreed with Flood Control Headquarters that before declaring a house fit for re-occupancy there should be, as a minimum, the following:

(a) The house should be clean, disinfected, and safe structurally.
(b) There must be a convenient source of water, suitable for use after chlorination or boiling.
(c) There must be a convenient, serviceable privy.
(d) Where there were small children, the flood waters must have receded far enough to leave a safe outside play area.

Farmers faced such a tremendous task in restoring their farms and caring

for stock that help was required to renew their homes. The Health Unit pressed for formation of clean-up crews, paid from the flood relief fund, for this purpose. At first there was opposition to the idea, but the crews proved so valuable that soon those who had opposed the scheme became supporters. Furniture was removed by the crews, and brushed and disinfected after being dried in the sun. Next, a stream of water from a high-pressure barn spray-unit was used inside the house to remove loose plaster, wallpaper, débris and mud. Soap and disinfectants were then used. Pumping out of basements was delayed until the water table had receded far enough to remove pressure from the foundations. The pressure of water-soaked soil pushed in the foundation of one house when the basement was pumped out too soon.

There was no community water supply, and giving an opinion on the potability of individual supplies was a delicate matter. Due to the large number of improperly constructed wells, and their position in relation to a septic tank or privy, it was impossible for a sanitary inspector to declare the water safe in the raw state, regardless of laboratory reports. However, people had been using this water in the raw state for many years. Partly due to public pressure, many water samples, some even from obviously unfit wells, were submitted to the Provincial Health Laboratory in Vancouver. In all cases people were advised to continue chlorination until the flood had subsided. The foundation was laid for future improvements by introducing owners to proper methods of construction and protection of wells, sand points and privies.

As the pressure of service to individuals lessened, the solution of other problems was approached. There had never been an organized garbage collection, even in the town of Agassiz. The Council was prevailed upon to institute one, and did so. Sanitary reports were made to the School Board and to the Provincial Department of Education on flood damage to schools, with recommendations for improvements. Three Indian reservations were surveyed and reported upon to the Department of Indian Affairs. As the acute flood problems became less noticeable, the chronic pre-flood problems again became dominant.

When the emergency had passed, the health team, in reviewing its efforts, felt that much had been accomplished. Not a single case of communicable disease had developed. Co-operation with the Health Department by the public left very little to be desired. The foundation had been laid for future sanitary improvements in connection with water supplies, sewage disposal, and schools. Where, before the flood, the people of the area had never recognized the need for the services of a sanitary inspector, the Council now petitioned the Provincial Department of Health and Welfare to help provide such a service.

Summary

Sanitation problems during the flood differed only in degree from problems routinely handled by a sanitary inspector. Sanitation principles remained the same, but methods varied.

Before a program could be developed, a sanitary survey was necessary. Information was gathered on topography, extent of flood, distribution of popu-

lation, and existing sanitary facilities such as sewage disposal, garbage collection, water and milk supply, including any chlorination and pasteurizing plants. The location of community feeding centres, including operating restaurants and temporary camps, was obtained.

The importance of meeting and explaining Health Department objectives to local community leaders was evident. Maintenance of communications was vital to successful institution of the sanitation program. Temporary camp sanitation was effected by the application of basic sanitary principles, mostly by means of improvisation. Methods of renovation of affected homes, disposal of dead animals, insect and odor control, were instituted. All water and milk was considered unsafe unless treated.

No communicable disease was encountered.

The Venereal Disease Problem in Canada

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THE problem of venereal disease control in Canada has largely been associated with the two world wars. During these wars venereal diseases occurred in epidemic proportions amongst civilian and military personnel alike, which required the establishing of special control programs to deal with the problem. During the First World War venereal disease rates amongst the Canadian troops overseas reached as high as 220 per 1,000 per year[1], whereas in World War II the highest rate was about 92. Early in World War I venereal diseases accounted for as many as 40% of all the sick in Canadian hospitals in England.

This high incidence rate was reflected in the civilian populations during and following the First World War. Realizing the serious problem that existed, the Dominion Council of Health recommended in 1919 that the Dominion Government vote $200,000 a year for the control of these diseases. This money was to be given to provincial health departments on a population basis and was to be a matching grant. This was the introduction of a Venereal Disease Grants program in Canada. Since that time, grants for the control of these diseases have been made annually to provincial governments, except for the interval between 1933 and 1938. These grants have varied from $50,000 to the present amount of $500,000 a year. It should be pointed out that the amounts have not always indicated the venereal disease problem for the years concerned.

During the interval between the First and Second World Wars, accurate venereal disease statistics were not available for most provinces. It is, therefore, difficult to obtain an exact picture of the trend between the war years. However, from Army and civilian statistics in other countries, there is some evidence to indicate that the incidence of syphilis has been declining for some years, even before the introduction of penicillin. Most authorities have also agreed that venereal disease rates have usually declined when the troops returned home following a war. Moore[2] contends that syphilis was already on the decrease before 1900, and that this disease began to have its greatest regression following 1905–1910 when fundamental discoveries had been made by Schaudinn, Wassermann, Ehrlich, and others. He presents Army and civilian

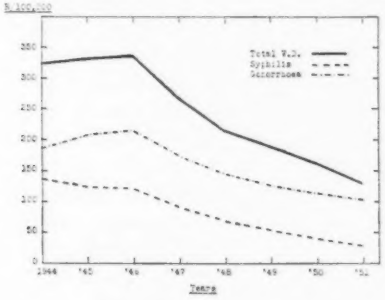
Presented before the Venereal Disease Control Section at the fortieth annual meeting of the Canadian Public Health Association, held at the Fort Garry Hotel, Winnipeg, June 12–14, 1952, in conjunction with the first meeting of the Manitoba Public Health Association.

statistics from several countries to illustrate his point and also infers that syphilis has reverted from an acute to a chronic disease over many years.

It was not until 1943, when a venereal disease control directorate was established jointly by the Armed Services and the Department of National Health and Welfare, that progress was made in developing an anti-venereal program in Canada. This joint organization provided the overall co-ordination between a venereal disease program for both military and civilian populations, and was responsible for establishing a standardized control, treatment and diagnostic service in Canada. At that time, a uniform venereal disease case reporting system was established, which has made it possible for venereal disease control officers, and medical health officers, to follow trends and to compare venereal disease rates at local, provincial and federal levels. These data have given us the most accurate available index of the venereal disease problem in Canada, and have been of inestimable value. A review of these

FIG. 1.

INCIDENCE OF VENEREAL DISEASE, CANADA, 1944–1951*



*Newfoundland included 1949.

statistics since 1944 (Figure 1) shows that although a slightly increased incidence occurred in 1945 and 1946, the overall venereal disease rate has decreased 51% during the past eight years. Syphilis alone has decreased 72.2% and gonorrhoea 35.6%.

Although the decline in venereal disease rates is most encouraging from a public health point of view, even more startling progress has been made in the treatment field. Syphilis treatment, which formerly was considered in terms of months or even years, now requires a matter of days to effect a cure by the use of penicillin. At the beginning of the Second World War the standard Army treatment schedule for most cases of syphilis included courses of Mapharsen and bismuth injections over a period of eighteen months. Later, in 1943, the schedule was reduced to twenty-six weeks. By the end of the War (1945), the duration of treatment for the average case of syphilis had been reduced to nine–ten days by the use of penicillin. A case of gonorrhoea, in contrast, which used to account for several days or weeks in hospital, now receives ambulatory treatment with penicillin and usually no time is lost from

work. Even when sulfonamides were used, gonorrhoea cases still often required several days in hospital. The Army experience shows that an average of twelve days in hospital was required when sulfonamides were used for the treatment of gonorrhoea.

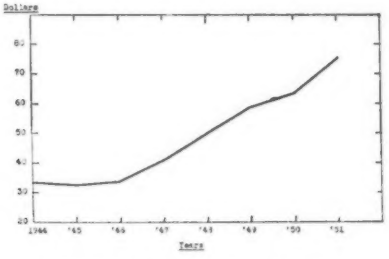
It is therefore apparent that the use of penicillin has greatly reduced the number of days required for the treatment of venereal infections, whether treatment was given in or outside hospital. The salvaging of man hours has been remarkable since the introduction of penicillin. Defects, or sequelae resulting from the later stages of syphilis, have also been influenced to some extent by penicillin,[3] but the full impact of this drug will not be known for at least another decade, during which time it will be possible to evaluate its effect on advanced syphilis.

Most of the credit for the gradual reduction of tertiary syphilis since World War I must be given to arsenic, bismuth, mercury, and other compounds which were in use before penicillin. The skilled use of these drugs, along with early treatment, improved case finding and educational programs, has largely been responsible for reducing the incidence of some of the more severe manifestations of advanced syphilis. An indication of this is contained in a statement made in 1917 by Dr. C. K. Clarke,[4] Professor of Psychiatry, University of Toronto, that 25% of male admissions to the Toronto Hospital for the Insane were syphilitic. In contrast to the situation in 1917, the first admission rate of neurological syphilitics to mental hospitals in Canada in 1940 was approximately 5.5% of total admissions. By 1949 the rate had further decreased to 4%. Mortality rates for syphilis have varied considerably since 1928, but they have also shown a gradual decline. Variations in reporting may have influenced these rates. However, from 1941–45, the average death rate for syphilis was 7.2 per 100,000. Since that time the rate has declined each year, and in 1949 it reached a level of 3.9, which represents a reduction of 46% in approximately 5 years.

With the steady decline of venereal diseases, particularly syphilis, during the past eight years, some provincial health officers and V.D. control directors have taken steps to reduce their administrative and field staffs, and in some

FIG. 2.

TOTAL EXPENDITURE PER CASE,* CANADA, 1944–1951†



†Newfoundland included 1949.
*Estimated expenditures.

cases have diminished or closed their treatment facilities. Similar retrenchment programs have been carried out in parts of the United States. There has also been some discussion about discontinuing pre-marital or other serological tests for syphilis. The argument usually presented is that the cost does not justify the very small number of proven positive cases which are detected. The decline of venereal diseases and the rising costs of materials, supplies, and services, has also influenced the cost per case in treating these diseases. Figure 2 shows that the expenditure per case has risen from $33.50 in 1944 to $73.00 in 1951. This is based on the overall expenditure for administrative treatment and control services in Canada.

In view of the present interest in venereal disease programs and because of contemplated reduction of venereal disease control services in this and other countries, it might be wise to take stock of the situation and ask ourselves a few questions. Firstly, are we justified in reducing V. D. control organizations and facilities, and secondly, does a V.D. problem exist today which necessitates an active control program? With the answers to these questions we shall be in a better position to plan logical control programs.

Let us first examine the venereal disease reporting system and the statistics that are derived. Venereal diseases are reported as confidential by the physician to the Provincial Health Department and are then forwarded at weekly intervals to the Dominion Bureau of Statistics. As the result of reporting the disease, the physician usually obtains free penicillin with which to treat the patient. In spite of the recognized shortcomings in reporting communicable diseases in general, to which must be added the intimate nature of venereal diseases, I do not think anyone could doubt that there has been a real decrease in the total syphilis infection rate during the past eight years in Canada. A decrease in the rate of 72.2% from 1944 to 1951 is very convincing. As might be expected, the most noticeable decrease has been in primary and secondary syphilis, although all forms of syphilis have also shown substantial decreases.

The incidence of congenital syphilis, on the other hand, has been marred by a lack of uniform diagnostic criteria which has resulted in a noticeable statistical artifact. According to some provincial reports, there has been a relative increase in the proportion of congenital syphilis to total syphilis over the past eight years. This has resulted because some cases reported as congenital syphilis are subject to question. Considerable variation exists from province to province, and even clinician to clinician, in the criteria used for the diagnosis of congenital syphilis. In some instances a diagnosis is made on little or no clinical or laboratory evidence. Often a history of exposure to syphilis constitutes the sole criterion for a diagnosis. Most of the congenital cases are usually in the adult age groups. Similar statistical defects have been noticed in the United States.[5] It would be well to correct this irregularity by standardizing and using uniform criteria for diagnosing congenital syphilis in Canada.

Over the past eight years, gonorrhoea rates have also shown a marked though less rapid decline but have generally paralleled those of syphilis, and represent a decrease of 35.6%. In the past few years, however, many areas in Canada, particularly some of the larger cities, have reported an increase in the incidence of gonorrhoea. These data would strongly indicate that we have

by no means conquered gonorrhoea. Venereal disease control officers in this[6] and other countries[7] have been justifiably concerned about the growing complacency of the general public, who assume that a venereal disease problem does not exist. Possibly the glowing publicity given to penicillin and the reputation it has acquired as a rapid cure and even as a preventive for gonorrhoea, has been partly responsible for developing a feeling of false security in many people. There has also been the danger that the low cost of the drug, and its ready access, has resulted in self-medication, which in turn will often lead to inadequate treatment. In spite of the magic power of this drug to cure gonorrhoea, it will not overcome the human weaknesses of man.

It is also known that non-specific urethritis has become increasingly prevalent in some parts of Canada and that there is a further danger of chancroid infection spreading to this country in increasing numbers, particularly from the Far East.

Realizing that we still have an important venereal disease problem in Canada today, how should we approach this problem in a logical manner to meet the changing situation in our environmental and social structure, and at the same time be prepared for times of war or national emergency?

Even if the venereal disease problem continues to decline, I believe it would be a great mistake to retrench so much that anti-venereal control programs would cease to exist, or would lose their identity. It has taken years to develop the present efficient organization in Canada, and too much retrenchment would require a similar developmental period if an extensive venereal disease problem should arise. This principle is all the more important when we view the unsettled world conditions of today and realize that venereal disease problems in the past have been chiefly associated with wars and national disasters. In this connection it is important that continuous liaison be carried out with the Armed Services during times of peace as well as war.

In maintaining at least the nucleus for a venereal disease organization, we should develop one or more health indices on which to base a flexible program to meet changing requirements of the population. One index would be the venereal disease incidence rate. An increased rate would indicate that a more intensified program was required, including an increase in field staff and possibly treatment facilities, and an augmented educational program amongst the public and the medical profession. Other more local indices could be developed in provinces and cities. For instance, routine gonorrhoea cultures on all vagrancy cases admitted to jail would provide the health officer with an index of the gonorrhoea infection rate for that segment of the population from which these cases were derived. This procedure has been in effect in many large cities in Canada and the U.S.A. for several years and has been used as a rough index of the reservoir of gonorrhoeal infection in the population.

An improvement could also be made in the venereal disease reporting system. Some physicians may subscribe to the idea that venereal disease is no longer a problem and may relax their diligence in reporting these diseases. It may, therefore, be necessary to place the facts before the medical profession to secure maximum cooperation in reporting. As mentioned above, there is a real need for the standardization of criteria used in the diagnosis of congenital and

other types of syphilis. At the present time, statistics on congenital syphilis are misleading and it is not possible to use these along with other data, to evaluate medical treatment and control programs.

A co-ordinated research program is also indicated in Canada. Because of the small number of venereal disease cases occurring in many provinces or communities, physicians are often unable to evaluate treatment or establish diagnostic criteria based on significant statistical numbers. A uniform and co-ordinated research program should be set up across Canada to evaluate many of our treatment and control procedures. The regular follow-up and assessment of treated cases for signs and symptoms of syphilis over a period of years would be one example of such a program. The results of these follow-up examinations would be combined from different parts of the country. If desirable, a sample of cases could be selected for this evaluation.

It would also be advisable periodically to review laboratory and case-finding services, to determine if they were necessary or adequate to meet the requirements. This type of research is presently being carried out in Canada, and the Treponema Pallidum Immobilization Test is under trial through the co-operation of the Ontario Department of Health, which has kindly offered to carry out this test for other provinces in the Central Laboratory in Toronto.

In the past, venereal disease control directors have led the public health field in establishing joint programs and in cooperating in the treatment and control of these diseases. The changing situation makes it all the more important that this practice be continued and that various clinical, laboratory or field studies be established to evaluate the venereal disease program of the day. The federal venereal disease grants program should also be critically examined to determine if they should be augmented, reduced or changed to allow financial assistance to be directed where it is most required and in such a way that the funds will be used most effectively.

Summary

The introduction of antibiotics, chiefly penicillin, during the past decade has accounted for a marked reduction in deaths, defects and disabilities from syphilis and gonorrhoea. From 1944 to 1951, syphilis rates have decreased 72.2% and gonorrhoea rates 35.6%. The use of penicillin has also changed medical and social practice in dealing with these diseases. As a result, the days of disability and duration of hospital treatment have been reduced to a fraction of what was required for the same disease even ten years ago. Similar decreases have been shown in the numbers admitted to mental hospitals suffering from neurological syphilis.

In spite of these advances in the venereal disease field, we should not be content, as venereal infections have by no means been eradicated. In fact, gonorrhoea has shown no noticeable decline in many centres during the past few years. Other venereal problems such as chancroid infections have also appeared as a threat.

A logical approach to the venereal disease problem would be to maintain flexible federal and provincial venereal disease organizations which could be strengthened as required to meet changing problems—for experience has

taught us to respect the superiority and adaptability of nature in overcoming man-made hurdles.

It is also important that research programs be established in this field to study and evaluate techniques and procedures and to develop new diagnostic and treatment methods.

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Nutrition Services in the Province of New Brunswick

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THE NUTRITION SERVICE was inaugurated in 1945 as a separate division within the New Brunswick Department of Health and Social Services. Its staff comprised a medical director, a senior nutritionist, and a junior nutritionist.

In 1949, Nutrition Services ceased to function as a separate entity and was absorbed into a newly formed Division of Maternal and Child Health. A dietary consultant to hospitals was added to the staff.

The advantages of the present administrative placement are concerned chiefly with the broader field which the re-organized division now covers. In our program the emphasis is placed on the improvement in health (in which nutrition is an integral part) of our most vulnerable groups: expectant mothers, infants, preschool children, mothers, school children, and convalescents. Our activities in nutrition thus blend in with the overall maternal and child health program.

The rural Child Health Conferences, conducted by the public health nurses, provide a valuable medium for reaching mothers of infants and preschool children. Every effort is made to contact prenatals at these conferences, since there are no prenatal clinics in our rural areas.

Our provincial school lunch program affords an opportunity for the nutritionists and nurses to promote good health habits amongst the school-age population. Through participation in these individual programs the children have good health habits firmly established as a result of daily practice. Since 1946 the number of lunch programs in New Brunswick has increased from 200 to 600, showing that more and more teachers and parents are convinced of their value. In addition to promotion carried on in the field, pre-service instruction is offered at the provincial Teachers' College, and in-service instruction at teachers' regional fall conferences.

Convalescents are reached mainly through our dietary service to hospitals. Practical assistance is offered to the dietary department staffs, and suitable nutrition education is directed to the patients.

The nutrition program is planned by the senior nutritionist, who consults with the director and with the chief medical officer of health before undertaking certain projects. She in turn advises and instructs the junior members of the staff, who may then deal directly with problems that arise in the course of their field work.

Our division maintains a close working relationship with other divisions within the department, notably the public health nursing service, which provides the necessary link with the regional districts. It would be difficult to over-estimate the value of the nurses' assistance in promotional activities and follow-up. The nurses are kept informed of latest nutrition trends and policies through monthly newsletters and through discussions at their bi-annual conferences. Whenever possible, the nutritionists accompany the nurses on visits to schools, but due to shortage of personnel in both services this is not too often feasible. The nutritionists also attend the nurses' rural Child Health Conferences and assist in conferencing, in setting up food demonstrations and exhibits, and in distributing selected literature. One nutrition topic only is emphasized at any conference; e.g., vitamin D preparations, home-prepared vs. "special" baby foods, whole-grain vs. refined cereals, etc. The nurses include nutrition (and school lunch) promotion as a part of their overall health program, in schools, at child health conferences, and on home visits.

The director of sanitary engineering and his district staff inspectors offer whole-hearted co-operation in related phases of the two services. For example, problems of sanitation in connection with school lunch procedures are referred to this division. Assistance is also available in regard to problems found on visits to institutional dietary departments; e.g., in dishwashing practices, refrigeration, food storage and handling, and equipment.

There is close co-ordination between our division and the Division of Dental Health. Nutrition and dental education is promoted jointly in school projects and in certain surveys.

The director and inspectors in the Division of Hospital Services offer generous support in all phases of our dietary consultant service to institutions.

The Division of Communicable Disease Control is consulted about certain hospital visits, more particularly in connection with tuberculosis sanatoria.

Social workers in the Mental Health Division refer any nutrition problems found in institutions and shelters. Our follow-up may lead to the discovery of related problems; for example, in regard to their food service, menus, and kitchen equipment needs.

As there is no health education division in our Department, every public health worker in the Province accepts health education more or less as his responsibility. Much of this falls on the public health nurses, through whom the programs of every division are channelled. A senior public health nurse gives a course in health education at the provincial Teachers' College, in which nutrition is an integral part. Liaison is maintained between teachers and public health field workers through this course of instruction.

Other departments and agencies in the province offer opportunities for co-ordination in nutrition education. The Department of Education provides the utmost co-operation in relation to our many school activities. The nature of their assistance will be described following mention of our relationship with other agencies.

Certain phases of our program relate to the work carried on by the Home Economics Service of the Department of Agriculture. Nutrition materials are supplied to their extension workers, and assistance in program planning is offered to their Women's Institute groups.

Since the closing in 1949 of the Red Cross Nutrition Service, our division has assisted in nutrition education projects sponsored by the New Brunswick Branch. A recent example is the dental-nutrition program of the Provincial Junior Red Cross, through which tooth brushes and fish-liver-oil capsules are provided for certain grades in school at a very low cost to the children. Our division assisted in the plans for this program and has supplied teaching aids and literature for the schools.

Requests for assistance are frequently received from district branches of the Victorian Order of Nurses. These groups are supplied with material on nutrition and other aspects of maternal and child health. Assistance has been given by our staff in the Order's series on prenatal care.

Upon request, assistance is given with budget problems presented by district Children's Aid Societies and urban welfare departments.

Our service in relation to hospital dietary departments is supported by the New Brunswick Association of Registered Nurses. Their Nursing School adviser reports on any dietary problems noted in the course of her visits to the hospitals, and assists in making certain recommendations.

The School Lunch Program

The school lunch program offers one of the best examples of the co-ordination which exists between our division and the Department of Education.

The Department of Education is represented on the Provincial School Lunch Committee, which also has representatives from the Departments of Health and Agriculture. Policies laid down by this committee allow for each of our nutritionists to spend two years in a selected area of the Province. This area is usually one of the fifteen counties.

The county superintendents of schools provide liaison with the teachers in the various regions. The first act of the nutritionist, when planning her two-year project for a selected area, is to obtain the county superintendent's approval for a program of intensive school-lunch promotion in his supervisory district. In addition, certain financial agreements must be reached, since the Department of Education provides the basic cooking equipment for rural schools. Following discussion of the school lunch equipment needs (previously assessed by the nutritionist), the county superintendent arranges with his County Finance Board to set aside a certain amount of money for this purpose.

The nutritionist meets the teachers in the county first at their August conference; then, in the early fall, at their local teachers' meetings (to discuss individual school lunch problems and equipment needs); and later, on personal visits to the schools, to assist in organizing the lunch programs.

At the end of the two-year period, the program is started in another county. At the same time, an attempt is made to follow up those programs in the original county which may require special attention. The public health nurses render valuable assistance in following up these programs on their routine school visits. Special check forms are supplied to nurses and teachers for the purpose of appraising and improving the individual lunch programs.

The schools, apart from receiving basic cooking equipment through the Department of Education, must rely on their own initiative, and on the assistance of local community groups, to finance their lunch programs. Approxi-

mately 600 rural schools in the Province, or over one-third, are providing *supplementary* lunches for the children.

Urban schools, and rural Regional High Schools, have lunch programs directed by their Home Economics Departments. Most of these are also supplementary in nature; only two or three schools in the Province offer a complete meal at noon.

Another example of co-ordination with this Department in the nutrition program is afforded by the provincial Teachers' College. Students in training learn rural school lunch methods through demonstration programs, whereby pupils of the Model School are served daily supplements. The Home Economics teacher supervises the student teachers in this project. Instruction in nutrition is also included in their health classes, where students learn principles and methods of integrating all phases of the school health program. Our division provides nutrition teaching aids and school lunch materials for evaluation by the student teachers.

The Department of Education's monthly publication, "The Forum", publishes many of our articles and photographs on nutrition and school lunches. Messages are also relayed to teachers in service through monthly bulletins sent out from the offices of the county school superintendents.

Selected health materials, including nutrition, are accepted for placement in the Department of Education Library. These include lesson plans, supplementary reference materials, and suggested classroom activities. They are available on loan to any teacher in the Province.

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The most important promotional activities of our division during the past year have centered round the school lunch program; nutrition teaching in schools (integrated with health and other subjects); evaluation and distribution of teaching aids; preparation of informative and promotional materials; and promotion of good food for infants and children (through the mothers interviewed at child health conferences). Simple prenatal diet sheets were prepared for distribution to expectant mothers through practising physicians and nurses. Also distributed, for the use of the physicians and nurses, was a reprint of the Ontario Interdepartmental Nutrition Committee's booklet entitled "Good Food for Expectant Mothers". Special school lunch check-forms were prepared for the use of nurses and teachers.

Our program is constantly being reviewed with respect to possible expansion of services. Expansion in the field of school lunch promotion is desirable, but is not readily foreseen due to the difficulty in finding nutritionists and nurses for public health work. It is anticipated that even more emphasis will be placed on our services to expectant mothers and to mothers of young children, since good nutrition plays such a vital role in the state of health of these groups. Expansion in this field is felt to be essential, in view of New Brunswick's high infant death rate. More publicity is being planned, in order that the public may become better acquainted with the services which we have to offer, and with nutrition projects currently in operation. While a certain amount of press publicity has been arranged, it is hoped that more attention can be given

to this. More attention will also be given to the preparation of displays and exhibits for teachers' meetings, Home and School conventions, Women's Institutes, fall fairs, and child health conferences. These will attempt to present more vividly the services offered by our division and to stimulate better health practices.

In widening our services to grade teachers, it is hoped that we may be able to arrange for panel discussions and possibly for workshops at their fall conferences. A unit of nutrition lessons, integrated with other school subjects, will, it is expected, be prepared sometime in the future. Our present school lunch manual for rural teachers will be revised, and the preparation of a similar manual, directed to home economics teachers, is under consideration. The assistance of the teachers will be sought in undertaking these projects, in an attempt to assure the presentation of completely practical and useful information.

Nutrition program planning will receive more attention in relation to the needs of community groups. With the development of Rural Folk Schools in the Province, it is expected that our division will continue to participate to the fullest extent.

With regard to personnel needs, additional staff is always desirable. It has been our hope for some time that a school lunch field worker might be employed jointly by the Health and Education Departments, to work as liaison between the Teachers' College and the rural schools. Up to the present time no action has been promised.

No services other than those outlined can be considered for some years to come, due to financial limitations and to difficulty in recruiting personnel with public health training. In the meantime, we hope to be able to maintain present services and to expand our program to the extent that those in greatest need of assistance may be served.

The Bethesda Group of Paracolon Bacteria

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THE term "paracolon" has come to occupy an accepted place in the literature. In the past it has been used as a convenient name for all those organisms that could not be identified as belonging to the Escherichia or Salmonella groups, but might be related to either antigenically. An effort has been and is still being made to bring about a more orderly classification of this group of organisms, and to evaluate their significance in cases of diarrhoea.

In 1943, Stuart, Wheeler, Rustigian and Zimmerman[1] suggested a classification of paracolon bacteria based on their biochemical and antigenic relationships. The literature dealing with the part played by paracolons in cases of diarrhoea was reviewed by Neter and Clark[2] in 1944, by Stuart and Van Stratum[3] in 1945, and by Barnes and Cherry[4] in 1946. In 1948, Edwards, West, and Brunner[5] made a study, from four outbreaks of diarrhoea, of 32 cultures which formed a rather uniform biochemical group and could be subdivided into serological types; these paracolon bacteria were designated the Bethesda group. A further study was made in 1949 of the Bethesda group by Moran and Bruner,[6] which gave a more comprehensive antigenic analysis.

For some time, organisms had been isolated at this laboratory which upon primary biochemical tests resembled the genus Salmonella. These could not be confirmed by serological tests and further biochemical tests were necessary in order to identify them. Since the identification of pathogenic organisms is of utmost importance in a public health laboratory, an investigation was started here on these organisms in 1947. The group chosen for study was the H_2S-positive, indole-negative, and citrate-positive strains, which, because of their ability to ferment lactose slowly, had been identified as *Paracolobactrum intermedium*. As these first isolates had no serological relationships to the Salmonella group, H and O antisera were prepared. The H antisera were made from formalinized broth cultures of strains which had been repeatedly passed through semi-solid medium to insure optimum development of the H antigen. The O antisera were prepared from broth cultures which had been heated at 100°C. for 2 hours. Satisfactory titres were obtained (with the H antisera using the tube method and the O antisera using the slide method). More of

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our isolations were then tested with these antisera and found to be serologically similar. There were some which gave only an H or O, and in these cases antisera were prepared for the "unknown" antigens. It appeared to us then that these cultures had not only identical biochemical reactions, but also an antigenic inter-relationship which could make possible a schema similar to that of the Salmonella group.

In 1948, Dr. P. R. Edwards, who was also interested in the paracolon group, very kindly sent us some polyvalent H and O antisera. This helped us considerably in the recognition of these organisms, and aided in verifying our previous work. In May 1948, Edwards and co-workers[5] published their study on the biochemical and serological properties of the Bethesda paracolon group. Following this, Dr. Edwards sent us the Bethesda strains described by him. Antisera were prepared for these and satisfactory titres obtained. In August, 1950, cultures were obtained and antisera prepared for the strains described by Moran and Bruner (November 1949).[6] Absorbed antisera were also made according to the method they recommended. Satisfactory results were obtained.

TABLE I

DISTRIBUTION OF SEROLOGICAL TYPES

Antigenic symbols			
O antigens	H antigens	Type strains	No. of cultures
1, 2	1	Na 1a	5
1, 3	8, 10	–	1
	17	–	2
1, 4, 5	1	–	8
	3	Na 12	2
	5	Na 22	9
	8, 10	Mich 7	4
	12	–	1
	14	–	1
	17	Mich 5	12
5, 6	8, 10	–	2
7, 8, 9	8, 10	–	1
7, 8, 10	4	–	1
	8, 10	–	1
	15	Mich 11	1
11	3	Na 19	3
	11	Mich 1	1
	13	–	1
	16	Md 6	4

A study was made of 60 Bethesda paracolon strains to determine their exact antigenic type. These cultures were tested with H and O antisera, as well as with absorbed antisera. The distribution of the serological types is given in Table I. The various combinations of H and O antigens are also given. The type strain is designated where that particular strain has already been described. The number of cultures of each type isolated is indicated in the 4th column. These 60 strains were taken at random from a large number of cultures with biochemical reactions similar to those of Edwards, West and Bruner (1948).[5]

TABLE II

COMPARISON OF STRAINS WITH BETHESDA TYPES ALREADY RECOGNIZED

Year	Biochemically typical		Biochemically atypical
	Antigens similar	Serology incomplete	H or O similar
1947	22	1	1
1948	22	5	2
1949	24	7	7
1950	62	29	20
1951	59	27	12
1952	41	26	9

Table II shows a comparison of the biochemical reactions of our strains with the types already recognized. In this study we have encountered three groups of Bethesda paracolons.

I. The first group gave typical biochemical reactions; that is, they were slow lactose-fermenting cultures that were methyl-red positive, Voges-Proskauer-negative, indole-negative, H_2S-positive, and citrate-positive, and produced acid and gas from glucose—in fact, adhered to the pattern of the Salmonella group upon first isolation. The table shows the number of cultures which were both biochemically and antigenically similar to those described by Edwards, West and Bruner[5] and by Moran and Bruner.[6] The antigenic analysis has been completed on 60 of these. The remainder have still to be tested with absorbed antisera to determine their exact type.

II. The second group is made up of those strains that are typical biochemically, but have only the H or O antigen similar to the Edwards strains.[5] In a few cases neither the H nor the O antigen of Edwards could be demonstrated. However, antigen or antigens not yet identified may be either a new type, or be related to or identical with the Michigan strains of Moran and Bruner.[6] They may fit into the Ballerup-Bethesda group described by West, 1952[7] (these two groups having been combined into one large group on the basis of their biochemical similarity and antigenic inter-relationships). Probably some of our isolated strains would fit antigenically into this new grouping.

III. The third group differs biochemically, but shows an inter-relationship in either the somatic or flagellar antigens. Some of these cultures were H_2S-negative. There were other strains which were Voges-Proskauer positive and showed a somatic relationship with the standard strain Md 3.

It might be of interest to note here that a unilateral relationship has been found between the somatic antigen of Md 3 and the "XII" antigen of the Salmonella group. All Salmonella strains with this antigen were agglutinated by the O serum of Md 3. No flagellar relationships between the two groups have been found by us.

Since a public health laboratory has a large number of specimens from which to choose, we were fortunate in being able to obtain Bethesda paracolons from a number of sources. Approximately 96% of the isolations were made from stool cultures. There was a small number of cultures from urine, three from blood, one from a mouth swab, and one from pus. Two strains were isolated from water.

TABLE III

THE OCCURRENCE OF BETHESDA PARACOLONS IN PATIENTS AND NORMAL INDIVIDUALS

Year	No. of isolations	Case histories received from:	No. with illness	No. with no illness
1947	23	3	3	0
1948	22	2	2	0
1949	30	19	16	3
1950	82	25	19	6
1951	98	20	15	5
1952	76	16	15	1

Most of the Bethesda paracolons from stool specimens reported here were isolated in routine examinations of persons supposedly suffering from some type of intestinal upset. Since these organisms were the only ones isolated in these cases, the pathogenicity of this group took on greater significance. Table III gives the number of isolations made, as well as the number of case histories which we have been able to obtain. Of the 85 histories recorded, 23 were from children under 12 years of age and 62 from adults. Approximately 82% of the patients showed definite signs of illness, while 16% showed no symptoms. If these paracolon bacteria are pathogenic, their pathogenicity is probably not as great as that of the recognized Salmonella or Shigella types.

TABLE IV

CASE HISTORIES SHOWING DISTRIBUTION OF SYMPTOMS

Year	No. of case histories	No. with fever	No. with diarrhoea	No. with vomiting	No. with previous Salm. or Shigella infection
1947	3	3	2	—	2
1948	2	—	2	—	3
1949	19	9	15	9	6
1950	25	11	14	9	20
1951	20	7	12	2	25
1952	16	8	15	6	13

Table IV gives the various symptoms which were apparent at the time of illness. In the 85 case histories received it was found that there were 60 instances of fever; 26 had vomiting and 60 diarrhoea. The fever and diarrhoea usually occurred at the same time.

During our study we found that in many instances the Bethesda paracolon was isolated from a patient's stool following a Salmonella or Shigella infection. In several cases where we received a number of specimens from a patient, each a few days apart, a recognized pathogen was first isolated. Eventually the pathogen and the paracolon were found in the same specimen. Finally, when the pathogen was no longer excreted, the Bethesda strain remained as the only significant organism. Of the 230 strains isolated here, 69 were from known Salmonella or Shigella cases. Unfortunately, we have not been able to make a further study of all patients infected with known pathogens. If this were possible, we feel that the percentage of Bethesda paracolons in

such cases would be much greater. However, the number of cases where only the Bethesda paracolon was found still points to the possible pathogenicity of these organisms.

Through the co-operation of Miss Jessie Millsap, who carried out the sensitivity tests on these strains, we are able to report these findings. The Bethesda cultures were tested against penicillin, streptomycin, aureomycin, chloromycetin, and terramycin. They were resistant to penicillin, and either completely resistant or only very moderately sensitive to aureomycin. However, streptomycin showed itself to be generally most efficient, as all the cultures tested were sensitive to this antibiotic. They did not show the same degree of sensitivity to chloromycetin or terramycin. Twelve cultures were tested against bacitracin, gantracin, sulphadiazine, sulphamarizine, and sulphathiazole. Only one was sensitive to gantracin. The remainder either were completely resistant or showed moderate resistance. It was interesting to note that the strains isolated in 1947 showed a marked sensitivity to streptomycin. The degree of sensitivity to all the antibiotics (including streptomycin) showed a gradual decline through the years from 1947 to 1952.

Summary

A comparative study has been made of the biochemical and antigenic reactions of the Bethesda paracolons isolated in Ontario with those already reported by Edwards, West, and Bruner,[5] and by Moran and Bruner.[6] A survey of the symptoms and possible pathogenicity of these strains has been made with reference to the work done in a public health laboratory.

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Administration and Methods of Enumeration of the Sickness Survey in Alberta

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THE ALBERTA SICKNESS SURVEY was conducted under the jurisdiction of the Hospital and Medical Services Division. As Statistician, I was assigned the task of supervising the Survey as part of my regular duties, devoting half of my time to the project. No additional office staff was employed until January 1951, when the assistance of a secretary was procured. Extra office space was not required, since the survey was conducted as part of regular activities.

My duties as supervisor included the general organization of the survey, road listing and sample selection, employing and training of enumerators, supervision of their work throughout the year, and the maintenance of office records and controls. At the conclusion of the survey year, all the reporting forms were given a final check before they were sent to Ottawa, and the Provincial Survey Report was prepared.

The sample selected for the Sickness Survey in Alberta was widely scattered and a large portion of it lay in isolated or semi-isolated districts. It extended from the Cypress Hills in the southeast corner of the Province to within twenty miles of the British Columbia border in the country north of Grande Prairie. The major national and language groups of Alberta were well represented in the sample. There were French-speaking settlements near Girouxville and Joussard in the Smoky River District; clusters in the heavily timbered area northeast of Sturgeon Lake and along the south shore of Lesser Slave Lake yielded several Indian and half-breed families. A portion of one cluster was only accessible by riding horseback for five miles through bush on an Indian reserve. Farther east and south our sample included a displaced persons settlement. Out of thirteen selected families in one of these clusters, only one was English-speaking. To interview the others, the enumerator took an interpreter with him. This particular district posed another difficulty. Muskeg fires burn there in the ground all the year round and break out into dangerous bush fires when conditions are right. These fires undermined and burned out some of the roads, thereby preventing the enumerator from making his visits that particular month. During this period the roads were banned for all traffic by the Royal Canadian Mounted Police because of the great danger.

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Ukrainian families were represented in the sample by an area around Vegreville and Two Hills. There, too, many of the families were unable to speak or write English.

In all, the dwellings selected for the sample numbered 564.

The original intention was to employ as enumerators married women who had had previous experience as school teachers. It was felt that their familiarity with completing forms, and their educational background, together with their ability to meet people easily, would be desirable qualities. However, in practice, it was found that such persons were not always available or else had too many responsibilities to take on added duties.

In choosing a suitable enumerator, the qualification most looked for was a pleasant, friendly, outgoing personality. It was felt that the ability to meet people easily and gain their confidence and respect was more important than an impressive record of formal education. In rural areas the choice was further restricted to those who were able and willing to drive a car, and who had one available for use. Many women who knew how to drive were unwilling to accept a position involving driving every month of the year in all types of weather and on all sorts and conditions of roads. Because of this it was necessary to obtain men as enumerators in some districts.

The enumerators were given a thorough period of instruction on the spot at the time they were employed. This was found necessary for two reasons: first, the enumerators were scattered so widely over the Province that the holding of classes was impracticable; and secondly, time did not permit the holding of classes even if other conditions had permitted.

All enumerators were engaged on a part-time basis. The size of the assignments varied from one to sixty-five households, depending upon distances between clusters, condition of roads, and type of terrain. In rural areas it was found best to have enumerators living within or close to the area being covered. The enumerators were paid a monthly fee designed to cover the cost of travel, as well as pay for the time and effort expended. In setting the amount of the fee, the number and location of households, total normal mileage, location and type of roads, were all taken into consideration. In all, we had thirty enumerators and three households reporting directly.

Because of the scattered nature of the sample, about 5,000 miles of driving and a month of time was required for each complete tour of inspection and supervision. This, of necessity, limited the number of inspections I was able to make during the course of the survey year. However, in addition to the original organizational tour, I completed four tours of supervision. On each of these inspection trips I checked all of the reporting forms of the enumerators, and brought to their attention errors that were being made. They, in turn, brought up any problems they had encountered. It was impractical, because of travel problems, to bring the enumerators together for group classes or discussions. In some areas the enumerators were asked to keep duplicate records and submit them for checking monthly. This was very helpful when the enumerators had small assignments.

Re-enumeration was not used since we believed it would do more harm than good. The type of information being obtained was of an intimate nature,

and it was only when the respondent had complete confidence in the enumerator that successful results could be expected. We felt that re-enumeration by a third party would tend to destroy the good respondent-enumerator relations that we had built up so carefully throughout. Nor was it reasonable to suppose that a third party in one visit could obtain the same degree of confidence that the regular enumerator had been building up gradually all year. Hence the two sets of information would not be comparable.

This does not mean, however, that no control was maintained whereby the accuracy of the data obtained could be judged. All hospitalized illnesses reported in the survey were compared with our hospital in-patient reports for a check on diagnosis, length of hospitalization, date of operation, etc. In addition, persons over seventy years of age were checked against our list of Old Age Pensioners for pension status, if any. A supplementary study to obtain verification of diagnoses of a proportion of those illnesses having had medical attention served as an additional check on the data we obtained in the survey.

I should like briefly to touch on some of the main enumerative problems. Bad weather, with that close associate bad roads, was our major difficulty. This was particularly true because of the rural nature of most of our sample and the fact that the precipitation was unusually high during the period our survey was in progress. As a result, it was impossible to contact all the survey households each month. Where the families kept good calendars this did not prove too serious; however, it was a real problem where the families were unable to write English. In other cases there was a tendency to forget to mark down certain data. As a result, it was not always possible to obtain the exact dates of illnesses, doctors' visits, etc.

The Indians in our survey presented another type of problem. It was found difficult to get the Indian families to take any genuine interest in the project. This was partially solved by having the wife of the Indian Agent as enumerator in one area, since they always seemed anxious to please the Indian Agent. It was also found that these Indians in isolated spots would not speak English to strangers, even though they were able to speak it quite fluently. For this reason it was necessary to engage an Indian enumerator for one cluster. In another area an Indian family lived in a tent during the summer months and moved it from place to place on their farm as the notion took them; the enumerator never knew under which tree he would find it the next time he called.

Generally speaking, the people of the province were very co-operative and seemed to take a genuine interest in the project.

You will be interested in learning something of the cost of this project as far as Provincial participation was concerned. Since no extra administrative staff was employed, with the exception of a secretary for part of the survey year, costs were kept to a minimum. The total cost of the Alberta Sickness Survey was $19,707.74. The cost of the enumerators was $12,888.00, an average of $2.07 an interview. The cost of administration was $6,819.74, most of which was spent in travelling. Only half of my own salary was charged against the survey, since part of my time was devoted to other work.

Listeriosis in Lemmings

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IN Canada *Listeria monocytogenes* was reported in 1949 in chinchillas by McKay et al.;[1] possibly the same organism was isolated by Kennedy[2] from a chinchilla in 1947. In 1949, Fish and Schroder[3] diagnosed *Listerella* infection in a cross-bred heifer. In 1950 nine cases of listeriosis in chinchillas, a bovine foetus, and an ovine lung and brain were recorded in the report of the Ontario Veterinary College. In 1950, Bigland[4] reported the isolation of *Listeria* from a canary and a chicken in Alberta.

Plummer and Byrne[5] in 1950 were the first to report the isolation of *Listeria monocytogenes* in lemmings. Although the colony from which their specimens were obtained included both brown and varying lemmings (*Lemmus trimucronatus trimucronatus* and *Dicrostonyx groenlandicus groenlandicus*) captured at Chesterfield and Morse Island, it appears that they isolated *Listeria* from brown lemmings only.

In the fall of 1952, we received for trichinosis studies 40 lemmings, *Dicrostonyx groenlandicus groenlandicus* and *Dicrostonyx groenlandicus richardsonii*, from the Defence Research Laboratories at Churchill. The animals were laboratory-bred, the original stock being from Coral Harbour, Southampton Island. The lemmings were sent by air transport to Toronto via Montreal.

The majority of the lemmings were experimentally fed live *Trichinella* larvae. On the following day two lemmings died; one infected with trichinosis had exhibited only a diarrhoea; the other animal, from the breeding colony, had been observed to "circle", and show terminal convulsions. Listeriosis was suspected. Within five weeks, a total of 35 lemmings had died; most of the deaths occurring in the experimentally infected lemmings were thought to be due to trichinosis, and the carcasses were not examined for *Listeria*.

The onset of the symptoms was sudden and could be readily overlooked in the resting animal. The infected lemming at first appeared less active than normal. It remained crouched, often with its head in the corner of the cage and eyes shut. Occasionally it scratched its eyes vigorously and a sticky white ocular discharge was observed. Within 4–24 hours the lemming began to turn its head to one side and to circle to that side. Convulsions were frequent until death, which ensued within 48 hours from the onset of eye symptoms. One lemming showed a watery discharge from the right ear and held its head on that side. From this animal *Listeria* was subsequently isolated from the brain. However, the most common symptoms were the ocular discharge, incoordination, circling, and terminal convulsions. These symptoms were intensified when the animals were disturbed.

Upon post-mortem examination of the 35 lemmings, gross lesions were seldom observed. In one case an enlarged spleen showed a large white necrotic area. In two animals both spleen and liver were enlarged, the latter showing a few pin-point, white necrotic foci scattered over its surface. The brain of only one lemming was examined microscopically. Sections revealed no pathological changes although the animal died in a convulsion.

After losing 10 lemmings in one week, we began to treat those which appeared ill. Only one lemming, a trichinous male numbered T-1, was initially given aureomycin; this was discontinued after two intramuscular doses of 1.6 mgm. The initial treatment of other sick lemmings was potassium penicillin, 1000 units orally three times a day. T-1 received penicillin after five days without treatment. After 12 lemmings on penicillin therapy had died within a week, aureomycin was also given. The aureomycin, in a dosage of 5 mgm./kgm. as used for mice by Zink et al.,[6] was added to the penicillin, the dosage of which was reduced to 576 units per lemming. The mixture was initially injected intramuscularly or intraperitoneally, and continued orally for six days. Since deaths continued, all the lemmings were treated with the combination of penicillin and aureomycin, regardless of symptoms. Daily feedings of a liver-yeast-vitamin preparation were also given. Five lemmings survived, including T-1, although it cannot be concluded that the treatment was responsible. This was not an experiment on listeriosis or its treatment. In fact, listeriosis was only suspected; it was not confirmed until after the remaining 5 lemmings had been killed to complete the trichinosis experiments. The purpose of treating the lemmings was to save as many as possible, and not to determine the effectiveness of the antibiotics.

Two lemmings which died of suspected listeriosis were sent to Dr. E. G. D. Murray, Professor of Bacteriology, McGill University. Dr. Murray isolated *Listeria monocytogenes* from the medulla of one of the animals, after it had been refrigerated at 4°C. for one month. Findings in the other lemmings were not reported.

Bacteriological examinations are still in progress. Brain samples from the dead lemmings have been refrigerated at 4°C. for 1–3 months, a procedure which Gray et al.[7] found to facilitate the isolation of *Listeria*. Gray et al.[8] also used a selective medium of 0.05% potassium tellurite in tryptose agar which he found useful for the isolation of *Listeria*. According to Olson et al.,[9] some strains of *Listeria* are inhibited by potassium tellurite. We used 0.04% potassium tellurite in blood agar for culturing 10 brain samples. In 5 cases only was *Listeria* isolated, one of which was T-1.

The organism isolated conformed to the textbook description, namely, a Gram-positive rod occurring singly, in pairs, or short chains in pallisade arrangement, changing to Gram-negative after 48 hours' incubation. Filaments were occasionally seen. A hanging-drop preparation from a broth culture incubated at room temperature for 24–48 hours presented a characteristic "tumbling" motility. Gelatin stab after 1–4 days' incubation at room temperature gave characteristic "puff-ball" extensions. On 5% horse blood agar a narrow zone of Beta-haemolysis was observed after 24–48 hours' incubation at 37°C. This haemolysis appeared to be enhanced upon refrigeration.

Discussion

It is unfortunate that at the time of the epidemic in the lemmings, listeriosis was not confirmed and a planned study of the disease was not carried out. As suggested by Plummer and Byrne,[5] it is possible that wild lemmings are carriers of *Listeria*, and manifest the disease only when their resistance is lowered. A sudden change in environmental conditions may be a contributing factor. Murray et al.[10] had the impression that adequate food would terminate the disease in rabbits.

Plummer and Byrne[5] stated that "It would appear that the disease in this species (lemmings) resembles that found in rabbits, guinea-pigs, and ferrets rather than the encephalitic type which occurs in ruminants." Our cases usually appeared as the encephalitic type. In foxes, according to Cromwell et al.,[11] and in ferrets, as reported by Morris and Norman,[12] listeriosis was mistaken for distemper. However, Levy[13] observed no symptoms in voles. Murray et al.[10] found that the epidemic in rabbits was of a septicaemic nature. Yet in a few cases where rabbits were found lying quietly on their sides, this lethargy was interrupted by short convulsive struggles, repeated at intervals and sometimes accompanied by screams. Traub[14] also found the disease in rabbits which he referred to as contagious meningo-encephalomyelitis purulenta.

From a review of the available literature, it appears that an acceptable name for the causative organism of this disease has not been determined. In Sweden in 1910, Hülphers[15] isolated an organism from rabbits which he called *Bacillus hepatis*, because of the necrotic foci in the liver. In England in 1924, Murray et al.[10] isolated an organism causing a disease in rabbits characterized by a monocytosis, to which the name *Bacterium monocytogenes* was given. A year later Pirie[16] isolated an identical bacillus from gerbilles, and called it *Listerella hepatolytica* because of the liver lesions produced. Pirie withdrew the specific name *hepatolytica* in favour of *monocytogenes*. At the Third International Congress for Microbiology, held in New York in 1939, it was reported to the Committee on Nomenclature that the generic name *Listerella* was preoccupied. It had already been given to a Mycetozoan by Jahn in 1906, and to one of the Foraminifera by Cushman in 1933. Thus Pirie[17] proposed the name *Listeria*. According to Graham et al.,[18] this name was not adopted as it had been previously assigned to a certain plant group, for which no reference was given. No botanical *Listeria* can be located by the author, although there is an orchid of the genus *Listera*. However, as listed in the Nomenclator Zoologicus 1939, *Listeria* was given to a Diptera by Robineau-Desvoidy in 1863.

The original description of this bacterium is also a controversial point. Odegaard et al.[19] state that it is believed that Hülphers was the first to describe the organism. In the sixth edition of Bergey's Manual of Determinative Bacteriology 1948, Murray includes in the appendix for binomials proposed for *Listeria monocytogenes*, "*Bacterium hepatis* Hülphers" (Sven. Vet.–Tidskrift 2, 1911, 271), from the necrosis of the liver of a rabbit. Murray states "However, failure to ferment lactose, rhamnose, sucrose and salicin with fermentation of xylose, and failure to infect guinea pigs and chickens, indicate

a possible difference between the two species." Hülphers[15] obtained acid in dextrose, galactose, and maltose; there was no change in arabinose, xylose, rhamnose, sorbose, saccharose, lactose, raffinose, adonite, dulcite, mannite, and sorbite. Various authors have reported that strains of *Listeria monocytogenes* give differing fermentation reactions. Hülphers found *Bacillus hepatis* pathogenic for rabbits, mice and horses. In his experiments on other animals, he used only two guinea pigs, chickens (number unstated), and one pigeon. He injected a 24-hour serum broth culture of the organism as follows: 0.5 c.c. intraperitoneally into one guinea-pig, and subcutaneously into the other; 1 c.c. intravenously and intramuscularly into the chickens; 1 c.c. intramuscularly into the pigeon. All survived, but conclusions cannot be drawn from such a small number of animals. Hülphers noted the rapid motility of the organism he isolated, and was able to stain the polar flagellum. He also obtained an inverted fir tree type of growth in a serum gelatin agar stab incubated 3 days at 38°C. Murray obtained a similar growth in Seastone's semi-solid medium with the lemming strain of *Listeria monocytogenes*. Thus it is possible that the organism described by Hülphers in 1911 and the one described by Murray et al. in 1926 are identical.

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WHITHER TUBERCULOSIS?

THE picture in regard to tuberculosis has changed so rapidly in the past five years that the question contained in this title is especially pertinent. The precipitous fall in mortality has exceeded all past records for so short a space of time. The death rate has fallen from 47.2 in 1946 to 24.5 in 1951, and preliminary estimates from the provinces indicate that the final report for 1952 will be below 20 per 100,000, a greater reduction than in any previous year.

In contrast to this clear-cut picture, the trend as to morbidity is not so definitely outlined. While it is very evident that over the years there are fewer active cases in the community, we are not able to support this contention with reliable statistics for the country as a whole. The picture is further complicated by the fact that case-finding services of all kinds have increased greatly during the last decade and treatment facilities have also increased by at least fifty per cent. The result is that more patients are on treatment in sanatoria than ever before and more cases have reached our records than at any time previously. It is gratifying to know that in most parts of the country waiting lists are now a thing of the past and we can now look forward to the time when all active cases will be treated promptly.

Time makes our impression stronger that the newer drugs—streptomycin, PAS and isoniazid—used in combination, at the proper time and for long enough periods, are better drugs than were at first thought. In any case, deaths from tuberculosis in sanatoria have fallen from over 20 per cent of discharges to one-quarter of that figure since the new drugs came into use. We are particularly indebted to the Medical Research Council of Great Britain and the Veterans Administration of the United States for their careful evaluation studies in regard to the new drugs.

On the epidemiological side much of interest is emerging. The wide use of the x-ray has provided a mine of information with respect to early diagnosis. We now x-ray more than three million Canadians each year in various services, and the relative value of our case-finding methods can be estimated. Some facts stand out in bold relief. *The family physician is still the greatest source of*

new cases; next comes the contact group. The routine examination of admission to general hospitals is proving a valuable source of case-finding. Not only is it a more productive source than the mass surveys of whole communities, but it is of particular value to the medical profession, which is already the most important source of new cases.

Mass community surveys have been most valuable, and from them we have learned to pinpoint our targets. We started out with the idea that all one had to do was to seek out the cases through mass surveys and all TB eradication would be added unto us, but it turned out to be more complicated than that. Actually all the mass surveys provide is a cross-section of the active disease on one day of the year or one day in three years—the average interval between surveys. A good deal of tuberculosis can develop in the interval and it is important to have facilities to find it. The other point is that prompt follow-up is essential. Too many people who conduct surveys think the important point is numbers rather than a prompt follow-up of those with abnormal films. Proper selection and timing of such surveys, with adequate follow-up through coordination with regional clinics, will be the watchword of the next decade.

Experience has amply demonstrated that the tuberculosis clinic is the hub in the control set-up. This is an endorsation of the "dispensary" principle enunciated by Robert Phillip so many years ago. From the clinic all the case-finding and treatment services should radiate and their coordination be affected. Experience indicates that through the clinic the B.C.G. program will be extended through special groups, such as nurses in training and medical students. At present it is being used for such groups and taking in more and more of the contact population. In the provinces of Quebec and Newfoundland it is also being used on a wider community scale.

The outlook for the future is bright. Effective control of tuberculosis during the next ten years would appear to be within the range of practical possibility. We predict that by that time whole areas of the country will go a year without a death or a reported case, and the campaign will become a mopping-up operation concentrated in certain groups and areas of the country. The Indian group will remain for some time a major problem, but even here rates are a half and a quarter of what they were even ten years ago in some of the provinces. The next ten years will prove to be of great interest in the final offensive against tuberculosis.

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